

Abstract Submitted  
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**Effect of surface conditions affecting voltage breakdowns** RANDOLPH FLAUTA, MARO AGHAZARIAN, University of Illinois at Urbana-Champaign, JOHN CAUGHMAN, Oak Ridge National Laboratory, DAVID RUZIC, University of Illinois at Urbana-Champaign, U.S.DOE DE-FG02-04ER54765 COLLABORATION — The maximum power transferred by ion cyclotron range of frequency (ICRF) antennas is dependent on the breakdown threshold when operated at high voltages. The voltage that these antennas can withstand is lowered and hence breakdowns occur due to many factors. The Surface Plasma Arcs by Radiofrequency - Control Study or SPARCS facility has a 0-15kV DC power supply to deliver power to flat cathode surface and semi-spherical anode made of Cu and Al under  $10^{-8}$ - $10^{-6}$  torr vacuum conditions. The effects of different surface conditions on the breakdown threshold were then investigated. Also, as the ICRF antennas used for heating plasmas may come into contact with contaminants from the plasma, Li was also deposited on the cathode surface through in-situ evaporation coating and its effect on the breakdown threshold was investigated. Results on surface roughness showed no significant dependence of the breakdown threshold on macroscopic surface roughness in the cathode arithmetic roughness range of  $\sim 77$ -1139nm. Microscopic surface features such as grain boundaries, impurities and imperfections may play a more visible role in affecting the vacuum breakdown.

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